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Measurement of Attitude Scores from Beliefs and Importances

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#50

College of Commerce and Business Administration
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FACULTY WORKING PAPERS

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May 12, 1972

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MEASUREMENT OF ATTITUDE SCORES FROM BELIEFS AND IMPORTANCES

Several studies have been published recently in consumer behavior which examine the cognitive structure of attitudes.[1] Most of these studies postulate that consumer's attitude toward a brand is determined by his evaluations on a set of relevant beliefs weighted by his importances of those beliefs. For example, a brand of toothpaste may be evaluated on beliefs about its decay prevention, brightening of teeth, or mouthwash properties. These evaluative beliefs are then weighted by the degree of importance of each belief. Finally, these weighted evaluative beliefs are summed together to create a single attitude score. The following generalized equation represents the basic theme underlying these studies:

$$A_{ij} = \sum_{k=1}^{n} B_{ijk} X C_{ik}$$

where A_{ij} refers to individual i's attitude toward brand j;

B_{ijk} refers to individual i's evaluation of brand j on a specific belief k (we will call it a belief);

C_{ik} refers to individual i's importance of that belief k (we will call it importance); and

n refers to number of beliefs and importances.

A number of researchers in social psychology, notably Rosenberg [4] and Fishbein [1], have also proposed very similar measurement of attitudes although the specific wordings or definitions of the two components vary. For example, Rosenberg derives a subject's attitude score toward an object by summing a set of weighted perceived instrumentalities of that object in attaining or blocking goals or values; the weights are the relative importances of those goals or values. Fishbein calculates a subject's attitude score toward an object by summing the weighted strengths of a set of beliefs about that object; the weights are the evaluative (goodness-

badness) aspects of the beliefs.

Thus in all the studies where the generalized equation is utilized to calculate a subject's attitude score, we find that the following ingredients are either implicitly or explicitly considered essential in the measurement of attitude: (1) two factors are needed to obtain a measure of an individual's attitude toward an object such as a brand; (2) these factors are multiplicatively related; and (3) the elements of these factors are summed together to form a univariate (and presumably also unidimensional) attitude score. The objective of this paper is to investigate some of the assumptions inherent in this weighted-sum method of measuring attitude scores.

In order to validate the attitude scores created with the use of the generalized equation, most researchers have utilized independent measures of affective or conative states of the subjects which are then either correlated with, or predicted from, the attitude scores.

MEASUREMENT ASSUMPTIONS AND PROBLEMS

The weighted-sum measurement of attitude based on a two-factor theory of attitudes seems plausible and even logical. However, there are at least four major assumptions built into the generalized equation which warrant further investigation because none of them is justified by the researchers.

First, are both the factors indeed necessary to calculate attitude scores? Although this is implicit, there is no write-up on the relative contribution of each factor. Although Rosenberg tried to vary each factor independent of the other, a number of procedural and methodological problems make his conclusions tentative at best. To add to this problem,

Sheth and Talarzyk [5] assert that importance factor is not only unnecessary but is detrimental to the correlation of attitude score with the affective state.

Second, why should we multiply the two factors? There is no logical basis nor any evidence to suggest that the individual weights (multiplies) the belief with its importance. This multiplicative relationship presumes that a low evaluative belief weighted by a high importance is the same as a high evaluative belief weighted by a low importance. What about an additive as opposed to the multiplicative relationship between the two factors?

Third, how do we know that an individual aggregates (sums) beliefs or their importances or both? Such aggregation presumes that negative and positive beliefs and their importances cancel one another and reduce the cognitive structure to a single value. Is it not likely that individuals retain a <u>profile</u> of an object with respect to relevant beliefs and their importances rather than a sum score? This profile hypothesis means that beliefs and importances are kept distinct and separate even though they may be correlated.

Finally, even if we presume that an individual aggregates beliefs or importances or both, do they sum beliefs and importances before or after multiplying with each other? The generalized equation presumes that the aggregation is made after multiplying beliefs with their importances.

The above-discussed four presumptions and their alternatives generate a total of ten different possible ways we can measure attitude scores from the information gathered on beliefs and importances. These possibilities with consequent algebraic relations are fully spelled out in Figure 1, and will not be discussed further.

Insert Figure 1 about here

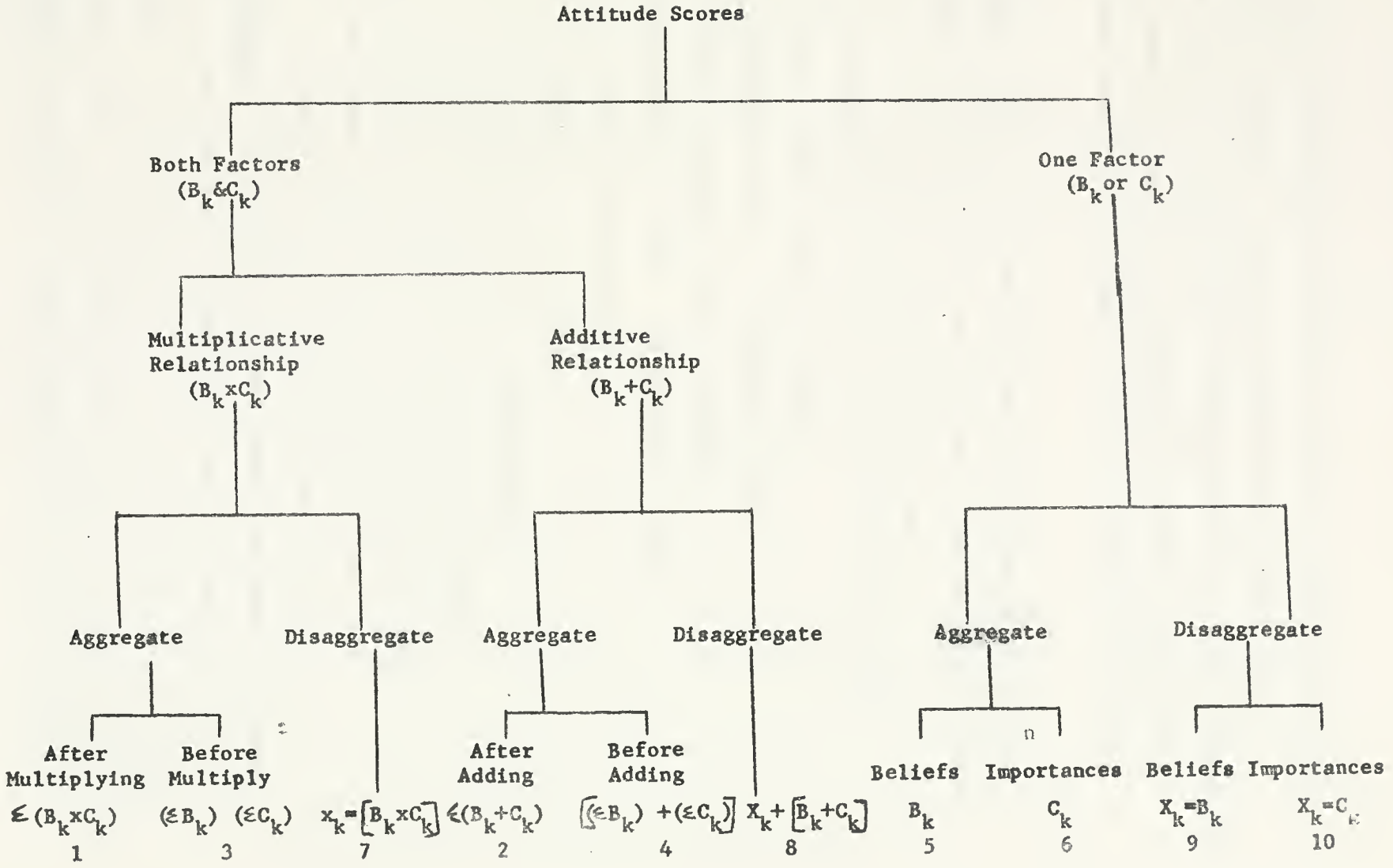
Unless we derive a definitive answer as to which specific measure of attitudes is most effective in terms of correlating with or predicting affective, conative and behavioral states, we cannot assess the relevance of the weighted-sum approach toward attitude measurement. The purpose of this study is to empirically investigate the relative effectiveness of the ten measures of attitudes.

DESCRIPTION OF DATA

The data for this study are a part of Columbia Buyer Behavior Project conducted under the leadership of John Howard. Based on a probability sample, a longitudinal panel of 954 housewives was established in one test market area. The panel members recorded purchases of several convenience food products including milk additives (instant breakfast, dietetic powders and meal supplements) for a period of five months beginning in the month of May and ending in October. In addition to reporting purchase behavior, the panel members were interviewed four times. The data relevant to the present investigation came from the first interview conducted by a mail questionnaire. This questionnaire was sent out at the time of recruiting the panel members, and it asked information on several things including the respondent's home involvement, breakfast eating habits, and attitudes toward both general and specific brands of milk additives. Based on a prior pilot study on 100 housewives, a total of 13 beliefs were used as relevant beliefs. The respondents were asked to rate the degree of importances of these beliefs as they related to specific brands. In addition, several brands were evaluated by the respondents on these 13

Figure 1

Possible Combinations of Beliefs and Importances
For Producing Attitude Scores



beliefs. Thus we have operational measures of the two components specified in the generalized equation. The data utilized in this study relate to beliefs about Carnation Instant Breakfast (CIB) and Sego, and their importances. In addition, questions related to the affective and conative states with respect to these brands were also asked. Below is a description of these measures.

A. Beliefs - They refer to beliefs about CIB and Sego measured on a sevenpoint bipolar scale. The following is the list of 13 beliefs.

1. Very easy to use - a little trouble to use
2. Poor substitute for a meal - good substitute for a meal
3. Low in calories - high in calories
4. Delicious tasting - not delicious tasting
5. Somewhat nutritious - very nutritious
6. Very good for a snack - not good for a snack
7. Low in price - high in price
8. Very filling - not very filling
9. Does not dissolve easily - dissolves easily
10. Provides lots of energy - provides little energy
11. Good buy for the money - not a good buy for the money
12. Has a real flavor - has an artificial flavor
13. Good source of protein - not a good source of protein

B. Importances - The beliefs, as given above, were asked to be rated on a three-point scale. Below is the specific question. "In general in deciding whether or not to buy _____, how important to you is each of the characteristics below? For each characteristic, please check whether it matters a great deal, matters somewhat, or

matters very little."

C. Affective State of Respondent - This was operationally measured in terms of overall degree of liking or disliking of the specific brand. The following seven-point bipolar scale was used:

In general, I like it very much ☐

In general, I don't like it ☐

D. Conative State of Respondent - This was operationally measured in terms of the respondent's intention to buy the brand within the next month. The specific question was a five-point scale given below: "How likely are you to buy ____ in the next month?"

(Please check one)

Definitely will ☐

Probably will ☐

Not sure one way or other ☐

Probably will not ☐

Definitely will not ☐

As mentioned above, the measures of affect and behavioral intention were utilized for validating and comparing various attitude measurements. The greater the correlation of a particular attitude measurement to these two validating questions, the more effective that measure was considered.

RESULTS AND DISCUSSION

Each respondent's attitude was measured in ten different ways based on the possible combinations of beliefs and importances given in Figure 1. To compare their relative effectiveness, we must correlate and validate them with the affective and conative states of the respondent. However, the standard procedure of using simple correlations (product moment, rank order or contingency type) could not be utilized for all the ten combinations because attitudes were not reduced to single scores. Instead, both simple

and multiple correlations and regressions were used wherever appropriate. The results of these correlations and regressions are summarized in Tables 1 and 2 on CIB and in Tables 3 and 4 on Sego. It should be pointed out that even though standardized regression coefficients are provided in these tables, our interest is to primarily examine the correlations between the attitude measures and the validating questions on affect and behavioral intention. Secondly, the sample size is identical (n=632) for all the correlations, and therefore they are directly comparable. Furthermore, the additional degrees of freedom lost in multiple regressions do not make this comparison invalid because of the large sample size.

Let us examine the results in terms of the objective of the investigation. First, aggregating beliefs and importances systematically produces lower correlations with validating measures. This is true whether we multiply the beliefs with their importances (equations one vs. seven), whether we sum the beliefs and the importances (two vs. eight), whether we use only the beliefs (five vs. nine), or whether we use only the importances (six vs. ten).

The greatest drop in correlations due to prior aggregation arises when only the importances are used as the single factor (six vs. ten). Also, in all situations where the importances are combined with beliefs, there is substantial reduction in the correlations due to prior aggregation (one vs. six, and two vs. eight). While prior summation also lowers the correlations in situations where only the beliefs are utilized as measures of attitude, the reduction is small and probably not significant (five vs. nine).

Second, the comparisons of multiplicative versus additive relationship between beliefs and importances reveal that in most cases, the additive relationship produces slightly better correlations (one vs. two; three vs. four; and seven vs. eight). However, there are some exceptions to this

generalization when attitude scores of CIB are correlated with the behavioral intention measure. In any event, the differences in correlations between the multiplicative and additive linkages of beliefs and importances are so small to be insignificant. This finding that additive versus multiplicative relationship makes no difference is most surprising in light of the strong controversy on linear additive models in psychological statistics.

Third, we find virtually no differences in correlations between relating each belief with its importance and relating aggregate beliefs with aggregate importances (one vs. three; and two vs. four). This finding is also very surprising because one would expect aggregation to create some type of gestalt phenomenon where the sum will be more than the parts.

Fourth, let us examine the relative correlations of each factor when utilized alone to generate attitude scores. Without an exception, the importances are poor correlates of both the validating measures. Furthermore, this is true whether we examine the aggregate measure (equation six) or the individual importance measures (equation ten). Just the opposite is true when attitude scores are created from the beliefs alone; the correlations are extremely good whether we use the aggregate beliefs measure (equation five) or the individual belief measures (equation nine).

The most surprising finding, however, is that when both the factors are added together either in a multiplicative or in an additive manner, the correlations tend to be lower than those found with beliefs factor alone (five against one, two, three, or four; and nine against seven or eight). The only exception occurs in the case of CIB disaggregate belief measures when correlating with the behavioral intention measure (equation seven vs. nine, Table 2). However, the difference is very small. Similar results have been recently reported by Sheth and Talarzyk [5] in other product

categories. However, these findings are contrary to intuition and logic; if importances do not add further correlations, there is no reason to believe that they should take away part of the strong correlations of beliefs with both affect and behavioral intention. To gain some insights, we have calculated multiple correlations and regressions in which each of the 13 beliefs and 13 importances was kept distinctly separate as an independent variable. Without any exception, we can see from Table 5 that it produces the highest correlation compared to all the ten possible combinations. Once again, the additional degrees of freedom lost (26 independent variables instead of 13) have little bearing on the results due to the large sample size. The results also show that although the correlations go up when each belief and each importance is distinctly kept, the improvement is not considerably more than when only the beliefs are retained as a factor (equation nine to be compared with Table 5). However, they are substantially higher when beliefs and importances are combined together prior to the regressions.

Thus, when beliefs and importances are kept separate and distinct we seem to get better correlations than when they are combined together either multiplicatively or additively. Some clues can be gathered as to why this should arise if we examine in Table 5 the sizes and, more importantly, the signs of beta weights of each pair of belief and its importance. It will be immediately noticed that the signs of beta weights of each pair are often opposite to each other. Thus, when one factor is positively correlated with affect or behavioral intention, the other is often negatively correlated and vice versa. Since only a few beliefs and a few importances have sizeable beta weights, it is also interesting to note that this reciprocal relationship is invariably present in at least one large beta weight situation.[2] This simply means that prior combining of beliefs and importances, either additively or multiplicatively, tends to produce attitude scores which do not

correlate strongly with affect and behavioral intention.

The fifth and final observation from the results summarized in Tables one through four is that affect (like-dislike) is consistently a better correlated variable than behavioral intention. Perhaps this can be explained by Sheth's [6] distinction between affect and behavioral intention in which the latter is also influenced by what he calls social factor and anticipated situation factor. A similar mediating factor was suggested by Fishbein [1] in what he calls social normative beliefs.

To summarize, this investigation strongly suggests that the most effective measure of attitude is to be obtained from the measures of consumer's evaluative beliefs about a brand. These evaluative beliefs should be retained separate and distinct as a profile measure rather than aggregating them into a single score. If these evaluative beliefs are strongly intercorrelated and if we wish to avoid the multicollinearity problem in further analysis, perhaps the profile could be reduced to component scores by way of principal components analysis. However, in no situation, should we aggregate beliefs and create a single attitude score.

FOOTNOTES

1. For a review of these studies, See [2,3, and 5].
2. It is possible to obtain the opposite signs due to the multicollinearity problem. However, examination of intercorrelations suggests that this is not true.

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Table 1

Regression of Affect on Beliefs and Importances

CARNATION INSTANT BREAKFAST

Simple Regressions

Equation	Correlation
1. $\sum_{k=1}^{13} (B_k \times C_k)$	.63
2. $\Sigma(B_k + C_k)$	.65
3. $[(\Sigma B_k) \times (\Sigma C_k)]$	.61
4. $[(\Sigma B_k) + (\Sigma C_k)]$	.65
5. ΣB_k	.67
6. ΣC_k	.14

Multiple Regressions

Equation =	7. $X_k=(B_k \times C_k)$ $k=1,2,\ldots13$	8. $X_k=(B_k+C_k)$ $k=1,2,\ldots13$	9. $X_k=B_k$ $k=1,2,\ldots13$	10. $X_k=C_k$ $k=1,2,\ldots13$
1. Easy to Use	.10	.11	.07	.17
2. Meal Substitute	-.10	-.10	-.10	.13
3. Low Calories	.04	.04	.03	.00
4. Delicious Tasting	.39	.39	.36	.03
5. Very Nutritious	.00	.01	.02	-.05
6. Snack	.05	.05	.06	.09
7. Reasonable Price	-.02	-.00	.01	-.05
8. Filling	.09	.06	.05	.09
9. Dissolves Easily	-.02	-.01	.00	.05
10. Lots of Energy	.05	.05	.04	.05
11. Good Buy	.05	.07	.09	-.11
12. Real Flavor	.19	.19	.21	-.00
13. Rich in Protein	-.01	-.01	.01	.07
Multiple R	.72	.75	.76	.37

Table 2

Regression of Behavioral Intention on Beliefs and Importances

CARNATION INSTANT BREAKFAST

Simple Regressions

Equation	Correlation
1. $\sum_{k=1}^{13} (B_k \times C_k)$	.55
2. $\sum(B_k + C_k)$	.53
3. $[(\sum B_k) \times (\sum C_k)]$	.53
4. $[(\sum B_k(+ (\sum C_k)]$	.54
5. $\sum B_k$	.49
6. $\sum C_k$	.34

Multiple Regressions

Equation =	7. $X_k=(B_k \times C_k)$ k=1,2,...13	8. $X_k=(B_k+C_k)$ k=1,2,...13	9. $X_k=B_k$ k= 1,2,...13	10. $X_k=C_k$ k=1,2,...13
1. Easy to Use	.13	.08	.01	.20
2. Meal Substitute	-.07	-.09	-.18	.18
3. Low Calories	.04	.01	-.03	.01
4. Delicious Tasting	.23	.21	.17	.13
5. Very Nutritious	.07	.06	.02	.02
6. Snack	.09	.09	.09	.10
7. Reasonable Price	.01	.02	.04	-.11
8. Filling	.09	.07	.04	.09
9. Dissolves Easily	.00	.02	.03	.04
10. Lots of Energy	.09	.07	.02	.11
11. Good Buy	.11	.15	.19	-.13
12. Real Flavor	.09	.10	.11	.01
13. Rich in Protein	-.09	-.08	-.06	.02
Multiple R	.61	.59	.59	.49

Table 3

Regression of Affect on Beliefs and Importances

SEGO

Simple Regressions

Equation	Correlation
1. $\sum_{k=1}^{13} (B_k \times C_k)$	.51
2. $\sum(B_k + C_k)$	.58
3. $\left[(\sum B_k) \times (\sum C_k)\right]$	.49
4. $\left[(\sum B_k) + (\sum C_k)\right]$	.64
5. $\sum B_k$	.64
6. $\sum C_k$	.01

Multiple Regressions

Equation =	7. $X_k=(B_k \times C_k)$ $k=1,2,\ldots13$	8. $X_k=(B_k \div C_k)$ $k=1,2,\ldots13$	9. $X_k=B_k$ $k=1,2,\ldots13$	10. $X_k=C_k$ $k=1,2,\ldots13$
1. Easy to Use	.02	.00	.01	.01
2. Meal Substitute	-.18	-.14	-.08	-.02
3. Low Calories	-.05	-.05	-.02	-.02
4. Delicious Tasting	.34	.37	.39	-.05
5. Very Nutritious	.06	.08	.11	.06
6. Snack	-.01	-.02	-.02	.06
7. Reasonable Price	-.01	.00	.03	.05
8. Filling	-.01	-.02	-.01	-.04
9. Dissolves Easily	-.11	-.02	.00	-.05
10. Lots of Energy	.04	.03	.03	.03
11. Good Buy	.09	.12	.13	-.09
12. Real Flavor	.31	.31	.30	.06
13. Rich in Protein	-.05	-.02	-.01	-.01
Multiple R	.71	.75	.78	.10

Table 4

Regression of Behavioral Intention on Beliefs and Importances

SEGO

Simple Regressions

Equation	Correlation
1. $\sum_{k=1}^{13} (B_k \times C_k)$	.42
2. $\sum(B_k + C_k)$	.46
3. $[(\sum B_k) \times (\sum C_k)]$	.42
4. $[(\sum B_k) + (\sum C_k)]$	.48
5. $\sum B_k$	.47
6. $\sum C_k$	.08

Multiple Regressions

Equation =	7. $X_k=(B_k \times C_k)$ k=1,2,...13	8. $X_k=(B_k+C_k)$ k=1,2,...13	9. $X_k=B_k$ k=1,2,...13	10. $X_k=C_k$ k=1,2,...13
1. Easy to Use	.04	.05	.08	.00
2. Meal Substitute	-.13	-.08	-.09	.03
3. Low Calories	-.09	-.09	-.06	-.09
4. Delicious Tasting	.17	.19	.21	-.07
5. Very Nutritious	.00	.04	.05	.05
6. Snack	-.00	-.03	-.04	.04
7. Reasonable Price	-.04	-.01	-.00	.04
8. Filling	.03	.02	-.02	.05
9. Dissolves Easily	.01	.07	.07	-.00
. Lots of Energy	.04	.01	.01	.00
. Good Buy	.18	.19	.19	-.03
. Real Flavor	.21	.20	.21	.06
Rich in Protein	.03	.03	.01	.04
Multiple R	.54	.57	.57	.15

Table 5

Multiple Regressions of Affect and Behavioral Intention on Individual Beliefs and Importances

$X_k = B_k$ $\quad k, j = 1, 2, \ldots 13$

$X_j = C_j$

	CARNATION INSTANT MILK				SEGO			
	Affect		Behavioral Intention		Affect		Behavioral Intention	
	$X_k=B_k$	$X_j=C_j$	$X_k=B_k$	$X_j=C_j$	$X_k=B_k$	$X_j=C_j$	$X_k=B_k$	$X_j=C_j$
1. Easy to Use	.07	.09	.01	.15	.00	.00	.06	-.01
2. Meal Substitute	-.09	.03	-.13	.11	-.08	-.02	-.09	.01
3. Low Calories	.03	-.00	-.01	-.00	-.02	-.01	-.06	-.09
4. Delicious tasting	.35	.09	.16	.17	.40	-.04	.21	-.07
5. Very Nutritious	.03	-.05	.04	.02	.10	.02	.04	.04
6. Snack	.05	.00	.05	.05	-.02	.01	-.04	.01
7. Reasonable Price	.01	-.00	.03	-.05	.03	-.01	-.01	-.01
8. Filling	.05	-.00	.03	.01	-.01	.00	-.02	.09
9. Dissolves Easily	.01	.01	.02	.00	.00	-.05	.07	-.00
10. Lots of Energy	.05	.01	.02	.09	.03	.05	-.02	-.01
11. Good Buy	.06	-.06	.15	-.10	.13	-.04	.20	.02
12. Real Flavor	.21	-.06	.11	-.03	.29	.04	.19	.05
13. Rich in Protein	.01	.03	-.05	-.00	-.01	.01	.01	.06
Multiple R	.77		.66		.79		.59	

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